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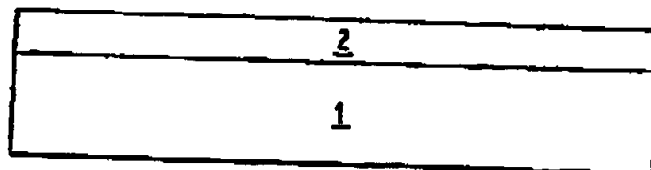
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(54) Method of improving the etch resistance of photoresists

(57) A photoresist system is provided that is easily structurable and is suitable for deep ultraviolet range patterning. An increased etching resistance to halogen-containing plasma is produced in a lithographically generated photoresist structure by treatment with an etch protectant. The etch protectant comprises predominantly aromatic structures and includes reactive groups that are suitable for chemical reaction with reactive

groups of the photoresist. In an embodiment, the photoresist includes a base resin containing no aromatic groups prior to reaction with the aromatic etch protectant. The etch protectant preferably includes an aromatic polycarboxylic acid, aromatic polycarboxylic acid anhydride, or aromatic polycarboxylic acid chloride.

FIG. 1



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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (INCL.7)
X,D	US 5 173 393 A (SEZI ET AL.) 22 December 1992 (1992-12-22) * column 6, line 44-59; claims 1-9 *	1-11, 14-17, 19,20	603F7/48
Y	US 5 234 794 A (SEBALD ET AL.) 10 August 1993 (1993-08-10) * claims 1,12; example 3 *	1-21	
Y	US 5 250 375 A (SEBALD ET AL.) 5 October 1993 (1993-10-05) * column 4, line 45-51; claim 1; example 16 *	1-21	
Y	J. R. SHEATS: "Photoresists for Deep UV Lithography" SOLID STATE TECHNOLOGY, vol. 32, no. 6, 1989, pages 79-86, XP000039570 Tulsa,OK * page 80, column 1, line 8-31 *	1-21	
A	DE 23 18 286 A (MORLAND PRODUCTS, INC.) 31 October 1974 (1974-10-31) * claims 15-21 *	1-21	TECHNICAL FIELDS SEARCHED (INCL.7) 603F
A	US 5 118 583 A (KONDO ET AL.) 2 June 1992 (1992-06-02) see abstract	1-21	
A	PATENT ABSTRACTS OF JAPAN vol. 12, no. 99 (E-594) 31 March 1988 (1988-03-31) & JP 62 229840 A (TOKYO OHKA KOGYO CO., LTD.), 8 October 1987 (1987-10-08) * abstract *	1-21	
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 17 November 2000	Examiner Thiele, M
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background D: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application I: document cited for other reasons A: member of the same patent family, corresponding document			

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EP 00 10 1348

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17-11-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5173393 A	22-12-1992	DE 59010728 B	31-07-1997
		EP 0394741 A	31-10-1990
		ES 2103261 T	16-09-1997
		JP 2309359 A	25-12-1990
		JP 2954273 B	27-09-1999
US 5234794 A	10-08-1993	DE 59010729 B	31-07-1997
		EP 0395917 A	07-11-1990
		ES 2103262 T	16-09-1997
		JP 2308255 A	21-12-1990
		JP 3001606 B	24-01-2000
US 5250375 A	05-10-1993	DE 59108680 B	28-05-1997
		EP 0492253 A	01-07-1992
		ES 2101710 T	16-07-1997
		JP 3067871 B	24-07-2000
		JP 5011456 A	22-01-1993
DE 2318286 A	31-10-1974	GB 1422698 A	28-01-1976
		NL 7305836 A	29-10-1974
US 5118583 A	02-06-1992	JP 2207255 A	16-08-1990
		JP 2207256 A	16-08-1990
		JP 2651235 B	10-09-1997
		JP 2251490 A	09-10-1990
		JP 2777181 B	16-07-1998
		JP 2254454 A	15-10-1990
		JP 2284146 A	21-11-1990
		JP 2103185 A	16-04-1990
		JP 2103187 A	16-04-1990
		DE 3934000 A	19-04-1990
JP 62229840 A	08-10-1987	JP 2613755 B	28-05-1997
		JP 8227868 A	03-09-1996
		JP 2115421 C	06-12-1996
		JP 6091060 B	14-11-1994

EPO/CPSS/Patent

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82